# DUAL OPERATIONAL AMPLIFIER

## ■ GENERAL DESCRIPTION

The NJM2140 is a low operating voltage (±1.0V min.) and low output saturation voltage operational amplifier of ultra miniature surface mount package.

Applications include Portable CD, Boom Box, Portable DAT and other digital audio systems which require single 5V operation and high output voltage swing.

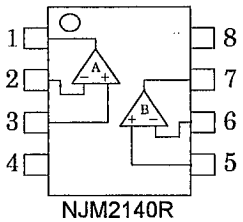
## ■ PACKAGE OUTLINE

NJM2140R

## ■ FEATURES

- ●Low Operating Voltage (±1V~±7V)
- ●Slew Rate (4V/μs typ.)
- ●Bandwidth (12MHz typ.)
- ●Maximum Output Voltage Swings (±2.4V typ. at $V^+/V^-$=±2.5, $R_L$=10kΩ)
- ●Bipolar Technology
- ●Package Outline VSP8

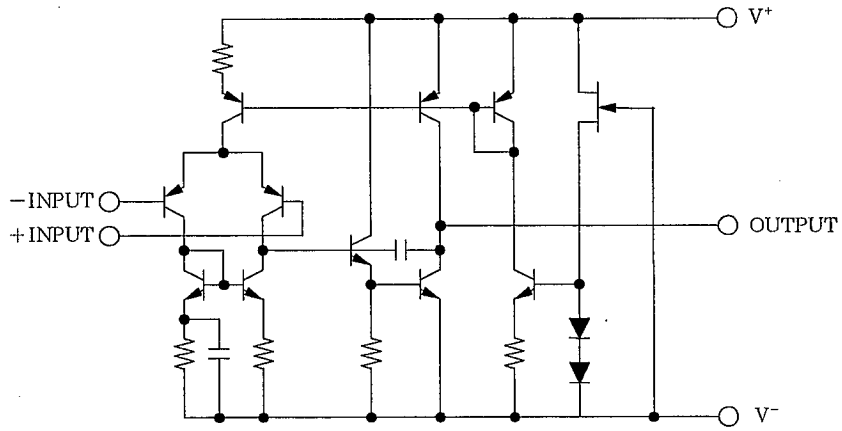
## ■ PIN CONFIGURATION




NJM2140R

PIN FUNCTION
1. A OUTPUT
2. A−INPUT
3. A+INPUT
4. $V^-$
5. B+INPUT
6. B−INPUT
7. B OUTPUT
8. $V^+$

## ■ EQUIVALENT CIRCUIT (1/2 Shown)



■ ABSOLUTE MAXIMUM RATINGS (Ta=25°C)

| PARAMETER | SYMBOL | RATINGS | UNIT |
|---|---|---|---|
| Supply Voltage | $V^+/V^-$ | ±7.0 | V |
| Differential Input Voltage | $V_{ID}$ | ±14 | V |
| Power Dissipation | $P_D$ | 320 | mW |
| Operating Temperature Range | Topr | −40~85 | °C |
| Storage Temperature Range | Tstg | −50~125 | °C |

■ ELECTRICAL CHARACTERISTICS ($V^+/V^-$=2.5V, Ta=25°C)

| PARAMETER | SYMBOL | TEST CONDITION | MIN. | TYP. | MAX. | UNIT |
|---|---|---|---|---|---|---|
| Input Offset Voltage | $V_{IO}$ | Rs=0Ω | − | 1 | 6 | mV |
| Input Offset Current | $I_{IO}$ | | − | 10 | 200 | nA |
| Input Bias Current | $I_B$ | | − | 100 | 300 | nA |
| Large Signal Voltage Gain | Av | $R_L$≧10kΩ | 60 | 80 | − | dB |
| Maximum Output Voltage Swing1 | $V_{OM1}$ | $R_L$=2.5kΩ | ±2.0 | ±2.2 | − | V |
| Maximum Output Voltage Swing2 | $V_{OM2}$ | $R_L$≧10kΩ | ±2.3 | ±2.4 | − | V |
| Input Common Mode Voltage Range | $V_{ICM}$ | | ±1.5 | − | − | V |
| Common Mode Rejection Ratio | CMR | | 60 | 74 | − | dB |
| Supply Voltage Rejection Ratio | SVR | | 60 | 80 | − | dB |
| Operating Current | Icc | | − | 3.5 | 5 | mA |
| Slew Rate | SR | | − | 4 | − | V/μs |
| Gain Bandwidth Product | GB | | − | 12 | − | MHz |

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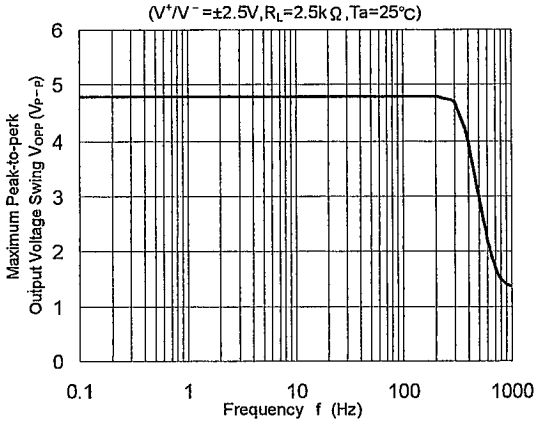
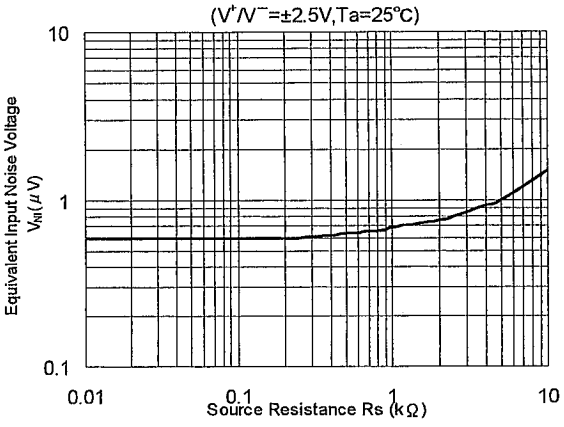
## ■ TYPICAL CHARACTERISTICS

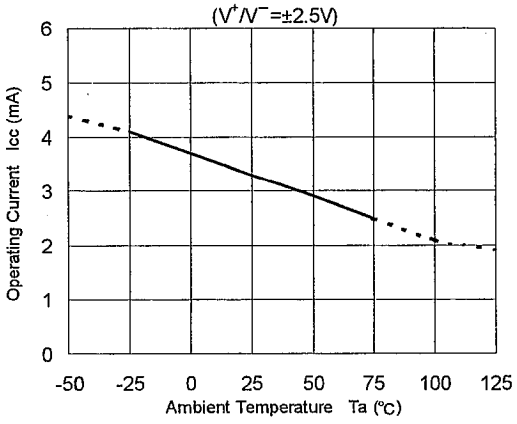
Maximum Peak-to-peak Output Voltage Swing vs. Frequency
($V^+/V^-$=±2.5V,$R_L$=2.5kΩ,Ta=25°C)



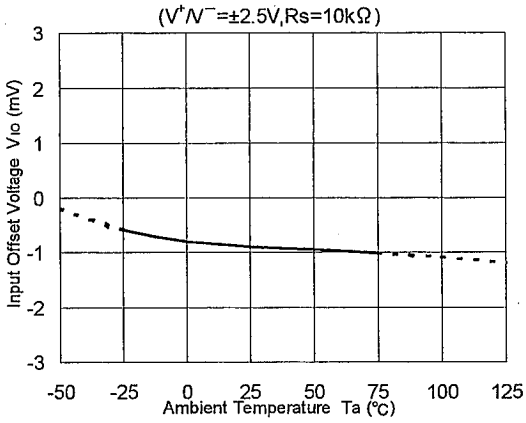

Equivalent Input Noise Voltage vs.Source Resistance
($V^+/V^-$=±2.5V,Ta=25°C)



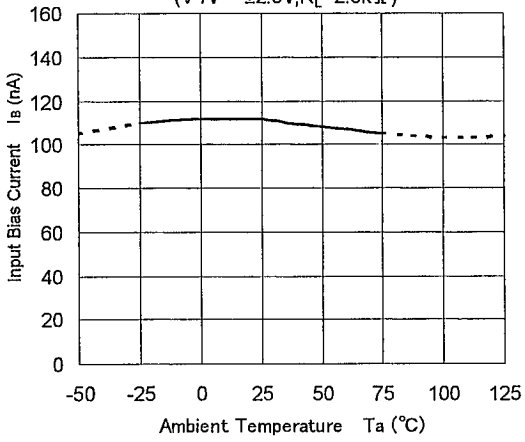

Operating Current vs.Temperature
($V^+/V^-$=±2.5V)



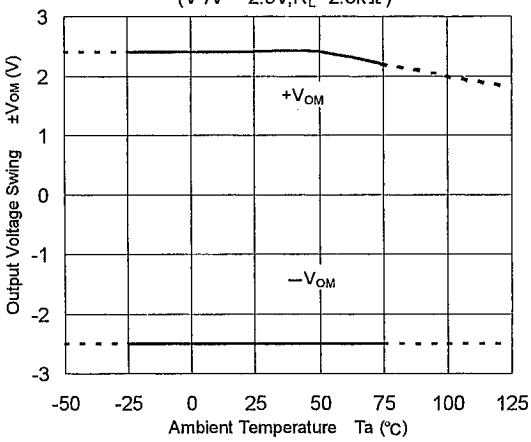

Input Offset Voltage vs. Temperature
($V^+/V^-$=±2.5V,Rs=10kΩ)




Input Bias Current vs. Temperature
($V^+/V^-$=±2.5V,$R_L$=2.5kΩ)

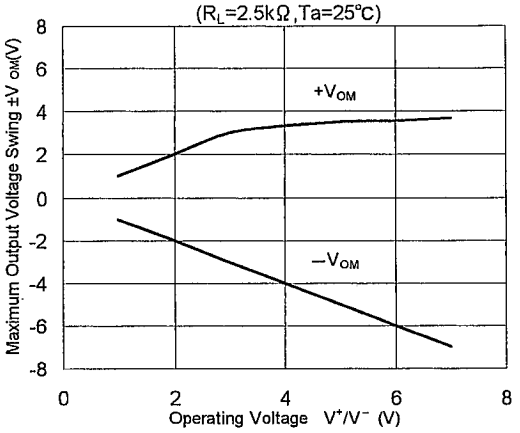



Output Voltage Swing vs. Temperature
($V^+/V^-$=2.5V,$R_L$=2.5kΩ)

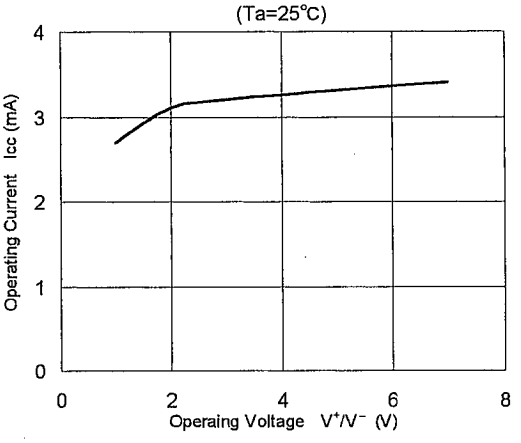


## ■ TYPICAL CHARACTERISTICS

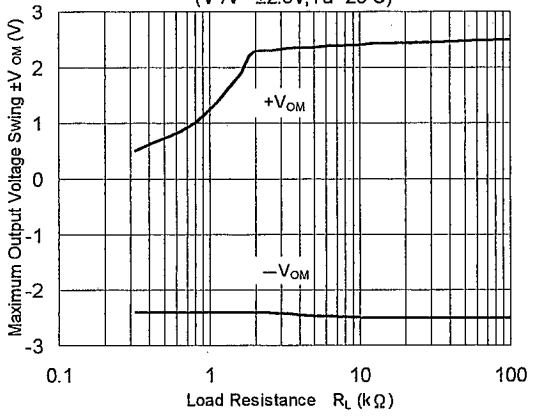
Maximum Output Voltage Swing vs.Operating Voltage
($R_L$=2.5kΩ,Ta=25°C)



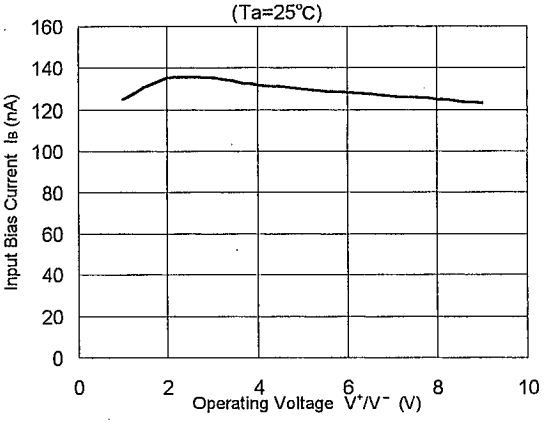

Operating Current vs. Operating Voltage
(Ta=25°C)



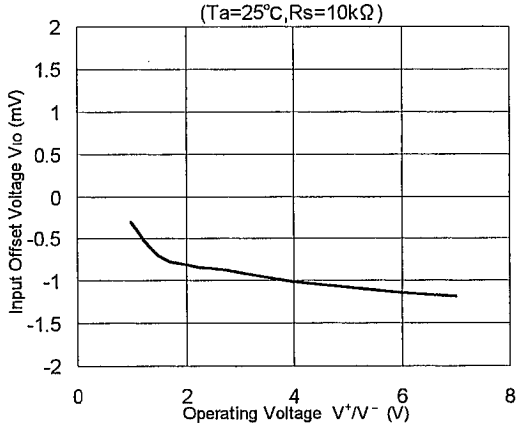

Maximum Output Voltage Swing vs. Load Resistance
($V^+/V^-$=±2.5V,Ta=25°C)



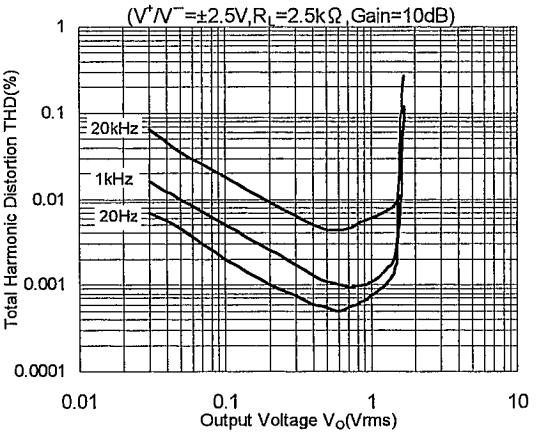

Input Bias Current vs. Operating Voltage
(Ta=25°C)




Input Offset Voltage vs. Operating Voltage
(Ta=25°C,Rs=10kΩ)




Total Harmonic Distortion vs. Output Voltage
($V^+/V^-$=±2.5V,$R_L$=2.5kΩ,Gain=10dB)



MEMO